

TRANSPORTATION

ABSTRACT: The United States has the largest transportation system in the world. It efficiently serves 284 million people and six million businesses scattered about our immense country. It is so important that organized activity would be impossible without it. Our transportation system plays a critical role in national and international affairs. It is the heart of our economy and a major part of the global economy as well. It empowers our political, informational and social influence in the global community. America's transportation system is also a critical element of national power. It enables the swift mobilization of our military during small-scale contingencies and supports the sustainment of our forces during long-term conflict. Our nation's leaders must address the capacity, infrastructure, labor and environmental issues facing our transportation system. Most importantly, industry and governments must collaborate to provide the significant capital investment needed to maintain and expand the infrastructure necessary to support the robust system demanded by the American people.

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Domestic:

Alameda Corridor Transportation Authority, Long Beach, CA
American Airlines, Fort Worth, TX
American President Lines, Los Angeles, CA
Amtrak, Wilmington, DE
Blount Island Command, Jacksonville, FL
Burlington Northern Santa Fe Railway, Fort Worth, TX
Burlington Northern Santa Fe Railyard, Alliance, TX
CSX Corporation, Jacksonville, FL
Federal Express, Memphis, TN
Jacksonville Port Authority, Marine Terminal, Jacksonville, FL
Long Beach Port Authority, Long Beach, CA
Union Pacific Railroad, Long Beach, CA
U.S. Customs, Los Angeles, CA

International:

British Airport Authority, Heathrow Airport, London, United Kingdom
British Airways, London, United Kingdom
Bureau Voorlichting Binnenvaart (Dutch Inland Barge Promotion Office), Rotterdam, Netherlands
Caterpillar Logistics Services, Brussels, Belgium
DHL Global Operations and Hub, Brussels, Belgium
European Commission, Brussels, Belgium
European Transport Systems, Port of Moerdijk, Moerdijk, Netherlands
589th Transportation Group, Military Traffic Management Command-Europe and Southwest Asia, Rotterdam, Netherlands
GE SeaCo, London, United Kingdom
Maersk Sealand, London, United Kingdom
Maersk Sealand Europort, Rotterdam, Netherlands
Railion, Rotterdam, Netherlands
Rotterdam Port Authority, Rotterdam, Netherlands
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U.S. Mission to the European Mission, Brussels, Belgium
Van der Vlist Moerdijk Terminal, Moerdijk, Netherlands
Van der Vlist Special Transportation, Groot Ammers, Netherlands

INTRODUCTION

Although it can be simply defined as a service industry that moves people and goods, America's transportation industry is anything but simple. It efficiently serves 284 million people and six million businesses scattered about our vast country. It transports the materials that build our nation, carries the food that feeds our people, and delivers the fuel that provides our energy. It takes us to work and to play, to school and to worship. America's transportation system is a critical element of our national power and a significant contributor to our national well-being. It is so important that organized human activity in our country would be impossible without it.

The United States has the largest transportation system in the world. It is comprised of a fleet of more than 20 million commercial trucks and buses, 190 million private automobiles, 1.5 million railroad freight and passenger cars and 7,600 certified air carrier aircraft. America's transportation system includes over 300 ports supporting 3,700 marine terminals and 5,000 berths that serve thousands of ships and barges. Gas and oil are transported in over 1.5 million miles of pipeline within the United States. Our transportation platforms operate on 192,000 miles of rail, four million miles of public roads and interstate highways, and 25,000 miles of waterways and harbor channels.¹ All together, the US transportation industry distributes 4 trillion ton-miles of products and allows people to travel 4.6 trillion passenger miles each year.²

Our transportation system plays a critical and indispensable role in national and international affairs. It is the heart of our economy and a major cog in the global economy as well. One third of our national wealth is directly devoted to transportation.³ One out of eight civilian jobs is transportation-related. Our transportation system carries over twenty percent of the world's goods and services.⁴ It empowers our political, informational and social influence in the global community.

The security of the United States is dependent upon a strong transportation system. America's transportation system enables the swift mobilization of our military during small-scale contingencies and supports the sustainment of our forces during long-term conflict. It is the vital link in the logistics chain that projects our nation's military might and once projected, sustains the war fighting strength of our nation and its allies.

The demands upon our transportation industry increase with every year. America's prosperity has created a population that is more mobile and consumes more than ever. International trade tripled in the last thirty years and will double in the next ten years. E-commerce, critically dependent upon the accurate and expeditious delivery of goods, continues to expand at an enormous rate. America's businesses continue to adopt just-in-time logistics to reduce inventory carrying costs, creating greater demands for reliable transportation throughout the production process. Finally, our military's transition to focused logistics requires information, logistics and transportation resources that support expanding roles and missions for all branches of the Armed Forces.

THE TRANSPORTATION INDUSTRY DEFINED

Transportation can be defined as the means by which freight and passengers are moved. Major components of the industry include air, maritime, pipeline, rail, and motor carrier.

Air – refers to airlift transportation provided by fixed-wing and rotary-wing aircraft. Industrial examples include: American Airlines, British Airways, Federal Express and DHL Worldwide Express, and Air Mobility Command.

Maritime – refers to waterborne transportation provided by ships and barges. Industrial examples include: American President Lines, Maersk/Sealand, and Military Sealift Command.

Pipeline – refers to the transportation of liquid and gaseous products through pipelines. Industrial examples include: Atlantic Richfield, Air Liquide, Shell, Equilon Enterprises and the Alaskan pipeline.

Rail – refers to railroad transportation provided by electric and diesel trains. Industrial examples include: Union Pacific, CSX, Burlington Northern/Santa Fe, Eurostar, and Railion.

Motor Carrier – refers to roadway freight transportation provided by trucks. Industrial examples include: J. B. Hunt, Overnite Transportation, and Van Der Vlist Special Transports.

Two supply chain management concepts integral to defining the transportation system are intermodalism and “just-in-time” logistics.

- Intermodalism is the movement of containerized freight through a coordinated transportation system that uses multiple delivery vehicles. Many products now move worldwide in standardized containers that easily transload onto truck chassis, rail cars, and ship decks as they move from origin to destination.

- “Just-in-time” logistics refers to the business practice of acquiring production materials and delivering finished goods at the moment of demand by the consumer. This practice enables businesses to reduce inventory carrying costs by substituting transportation for inventory.

CURRENT STATE

America’s transportation system currently supports the public and private needs of our country. It is able to deliver the goods and materials that enable economic growth. It effectively meets the demands of our nation’s travelers and it is capable of supporting the mobilization requirements of our Armed Forces.

Revenues generated by all sectors of the transportation industry are cyclic and tightly correspond to the growth of our nation’s economy. As America’s economy declines or becomes stagnant, transportation industry revenues respond in kind. March 2001 industry reports show a 13 percent decline in profits across all sectors, a reflection of the slowing US economy and rising fuel costs.

Air: The air transportation sector is strong. Passenger traffic growth has averaged 4.5 percent over the past five years, with air cargo and express freight growing just slightly over three percent. Revenue from domestic and international passenger operations increased by a combined 3.9 percent. Air cargo and express freight revenues increased by 5.1 percent. Recent trends reflect declining revenues with the nation’s five major airlines posting losses in the last quarter.

The passenger sector has seen continued consolidation and the formation of international alliances. American Airlines will take over Trans World Airlines during 2001 while United Airlines continues negotiations directed at acquiring US Airways. This will result in the top five US airlines earning over 80 percent of our nation's passenger traffic revenue. Additionally, our national airlines are forming strategic alliances with foreign airlines to create worldwide networks. One factor that may accelerate this movement toward international alliances is the continued push for Open Skies treaties between the US and foreign governments. As these bilateral agreements are approved, US airlines will gain greater access to foreign markets.

The air cargo sector is expanding service from the delivery of packages to offering a complete range of logistics services. These services include supply chain management, inventory storage and control, customer service, as well as the real-time tracking of freight on a time-definite-delivery schedule.

The air transportation sector continues to improve productivity through the wise application of information technology. Sophisticated yield management programs effectively market seats to business and pleasure passengers while matching the supply of available seats to the demand. Air cargo carriers employ web-based systems to provide an accurate and up-to-date status of customer packages. Their ability to provide in-transit visibility and just-in-time deliveries has enabled clients to reduce inventories and decrease carrying costs. Web-based ticket purchases continue to increase, along with an increased use of electronic tickets. These services provide cost savings as customer service staffs are reduced, increasing the competitiveness of the firms.

Maritime: As the world's leading maritime power and trading nation, the United States is keenly dependent upon a vibrant Marine Transportation System (MTS). Shipping, the most economical means of transporting freight, moves about 90 percent of the world's trade. Our country accounts for over 20% of that trade.⁵ Our MTS supports 95% of all international trade with the United States.⁶ The impact of our MTS upon national prosperity is reflected annually in the:

- Movement of more than two billion tons of domestic and international freight;
- Distribution of 3.3 billion barrels of oil imports;
- Transport of 134 million passengers by ferry and another five million by cruise ship.

With the exception of the commercial shipbuilding industry, America's MTS is healthy. Infrastructure at our ports and harbors and along our waterways is sufficient to support current domestic and international trade. Technological advances have improved cargo tracking, inventory control, intermodal operations, and customs clearance procedures. Labor unions provide a trained and well-paid work force for the industry.

Our MTS, including Military Sealift Command, is capable of supporting our nation's mobilization requirements. Our sealift capability is the strongest it has been since World War II. There is concern, however, that the quantity of merchant mariners is insufficient to support our Ready Reserve fleet.

The commercial shipbuilding industry is one significant area of weakness with our current MTS. Despite the enormous influence of commercial shipping upon our national power, our commercial shipbuilding industrial base accounts for less than one

percent of the world's gross tonnage.⁷ Our government recognizes this weakness and has enacted legislation designed to revitalize the industry.

Pipeline: Pipelines are important contributors to the transportation system, carrying more than 1.34 billion tons of petroleum products and industrial slurries each year. Pipelines are also a vital supply link, providing large quantities of water for agriculture, industrial processes, and municipal utility systems. The use of pipelines has increased 60 percent since 1960. In the near term, the pipeline industry looks forward to an extended period of expansion, particularly in the natural gas sector.

Rail: America's freight railroad industry is dominated by four companies, with Union Pacific and Burlington Northern/Santa Fe operating to the west of the Mississippi River, and CSX and Norfolk Southern operating to the east. Over the past ten years acquisitions and mergers have left our four major freight railroads treading water while consolidating corporate assets. However, recent trends are positive and reflect an industry on the road to recovery. Our freight railroad sector meets our nation's current demands for rail service and possesses the capacity to support economic growth projections.

US freight railroads directly contribute \$13 billion a year to the economy in wages and benefits to more than 200,000 employees, and billions more in purchases from suppliers.⁸ America's freight railroads carry more than 40 percent of the nation's inter-city freight; 70 percent of vehicles from domestic manufacturers; 64 percent of the nation's coal, which generates 36 percent of the nation's electricity; and 40 percent of the nation's grain.⁹ Among Class 1 railroads, defined as those exceeding \$255.9 million in operating revenues, freight volume in 2000 was 1.46 trillion ton-miles.¹⁰ US railroads hauled nearly 17 million carloads of freight in 2000, including nearly 10 million intermodal trailers and containers.¹¹

The freight sector of the railroad sector accounted for \$36 billion and 7.8 percent of the total US commercial freight market in 1999. Intermodal operations, the fastest growing segment of the industry, accounted for almost 18 percent of those revenues. The slowdown of the economy, sharply higher fuel prices, and increased interest expenses led to mixed financial results for the major railroads in 2000.

Our nation's local commuter rail systems are widely used and effectively support the relief of automobile traffic congestion. Amtrak, the country's long distance passenger rail company, is not financially solvent. On December 2, 1997 Congress passed the Amtrak Reform and Accountability Act (ARAA) of 1997 (P. L. 105-134, 111 Statute 2570). The ARAA established a deadline of fiscal year 2003 for Amtrak to improve operations sufficiently to eliminate its need for further federal operating subsidies. According to its 1999 annual report, Amtrak's losses increased by \$153 million over the previous two years. There appears to be little chance that Amtrak can operate without substantial federal subsidies anytime in the near term.

Motor Carrier: The motor carrier sector continues to be the dominant mode of freight transportation in America, and has been since the early 1960s. The trucking sector transported 68 percent of our nation's domestic freight in 1960. By 1997, the total tonnage of commercial freight hauled by trucking had increased to 80 percent.¹² There are over 450,000 interstate motor carriers registered with the Department of

Transportation, employing almost ten million people, including three million drivers who log 428 billion miles annually.¹³

The motor carrier sector has seen its fortunes decline sharply over the past year with industry profits declining 13 percent.¹⁴ Particularly hard hit were independent owner operators and interstate motor carriers that operate six or fewer trucks. Over 3,650 trucking companies went out of business in 2000. Not surprisingly, surviving companies purchased relatively new repossessed trucks instead of buying new ones. As a result, sales of new trucks plunged 30 percent from November 1999 to November 2000.¹⁵ This downturn rippled throughout the truck manufacturing sector, where firms like Freightliner and Peterbilt laid off thousands of workers as production of heavy rigs plummeted from a record 262,000 in 1999 to an estimated 120,000 for 2001.¹⁶

CHALLENGES

The challenges facing the transportation industry are numerous and capital intensive. Infrastructure expansion and modernization are critical issues for all modes of transportation. America's major transportation hubs are experiencing increasing congestion. Labor concerns are common throughout the industry. Rising fuel costs significantly impact corporate profits and financial stability. The outcomes of our expanding transportation system must be balanced against their environmental impact. Safety and security remain industry-wide challenges. Finally, technology must be leveraged to maintain our competitive advantage in the global market. The challenges posed by advancing technologies are presented as essays in the last half of this report.

Infrastructure Expansion and Modernization: America's public and private sectors demand an extensive and modernized infrastructure to support our nation's transportation industry. Our highways, railroads and bridges require continuous maintenance and upkeep. Our harbors, intercoastal and inland waterways need continuous dredging to sustain channel depth. Our antiquated air traffic management system must be modernized to support increasing demands upon the air transportation system.

The industry and the nation face the significant challenge of reinvesting in its core transportation resources: 59 percent of US roadways are in poor, mediocre or merely fair condition, 31 percent of the nation's 582,862 bridges are either deficient or functionally obsolete, 44 percent of inland waterway locks and dams are over fifty years old, and 21 percent of US railroad track requires significant improvement. The American Society of Civil Engineers estimates the nation must invest \$1.3 trillion over the next five years to repair and improve our transportation infrastructure.¹⁷

The most critical aspect of the transportation infrastructure problem is congestion. Motor vehicle overcrowding is a major problem in 39 of the 70 largest US cities and at 22 of the nation's busiest airports.¹⁸ The combination of expanding trade and increased travel will only worsen the congestion problem. National, state and local governments and private industries have joined forces in addressing this critical issue. In the Los Angeles/Long Beach port region, the Union Pacific Intermodal Container Transfer Facility and Alameda Corridor Rail project provide examples of congestion relief efforts that increase distribution efficiencies.

Air traffic congestion at many of our major airports has reached unprecedented levels, placing extraordinary burdens on our nation's air travelers. Recent statistics from the Bureau of Transportation concerning the air passenger sector reflect the highest percentage of delayed, diverted, and canceled air passenger flights in our history.

The leading growth area for global trade is in container shipping and the leading trend in container shipping is the deployment of larger container vessels. Shipping lines save \$4.5 million dollars per voyage by switching from a 2,500 twenty-foot equivalent unit (TEU) vessel to a 6,000 TEU vessel.¹⁹ These gigantic vessels require deeper and wider channels and deeper and longer berths. According to a September 2000 report by the US Army Corps of Engineers, container ports around the world are deepening navigation channels to between 49 and 53 feet. Since channel depths at most US ports typically range from 35 to 45 feet, our ports and harbors will require extensive deepening to accommodate this global fleet of ultra-large container ships.

Labor: A common theme throughout the transportation industry is the lack of qualified labor. Shortages of pilots and aircraft mechanics prevail in the air transportation sector. Studies indicate the trucking sector continues to experience a shortage of approximately 80,000 drivers. This shortage has caused the average annual salary for truck drivers to grow 15 percent over the past 3 years to approximately \$40,000, thereby increasing operating costs.²⁰ The lack of experienced merchant mariners within our country has raised concerns about inadequate support for our Ready Reserve Fleet. Although recent consolidations have left the railroads with a robust labor force, future expansion may present labor challenges for that sector as well.

All sectors of the transportation industry must deal with the consequences of a labor force that is heavily unionized. Particularly vulnerable is air transportation. Recent labor disputes have impacted United Airlines, COMAIR, Lufthansa and Northwest Airlines. Numerous union contracts are up for negotiation in 2001, setting the stage for additional strikes. Industry managers view the increasing demands of unionized labor as one of the greatest threats to the financial stability of the air transportation sector.

Rising Fuel Prices: Another major challenge to the financial stability of the transportation industry is rising fuel prices. Fuel prices have increased over seventy percent in the last year. The Air Transport Association reports a twenty-cent increase in jet fuel results in a one billion dollar increase in operating expenses for their sector. The American Trucking Association presents similar data. It estimates last year's rise in fuel prices cost the sector approximately one billion dollars a month.²¹ With the large shipping vessels consuming 210 tons of fuel each day, rising fuel costs impact the world's shipping companies as well.

Environment: As the demands upon transportation increase, the demands for an environmentally-safe transportation industry increase. Engine emissions, dredging and ballast water present serious challenges for global industry.

The US per capita emissions from travel exceed those of major industrialized countries as Americans travel twice as far (or twice as much) by car as Europeans and five times farther (or more) by air.²² Carbon dioxide emissions from freight carriers grew 49 percent in the US over the past 25 years. The shift towards motor carriers and away

from rail and inland shipping has resulted in motor carriers becoming a primary driver behind increased carbon dioxide emissions since 1973.²³

We already dredge approximately 400 million cubic yards of sediment from our nation's harbors each year. Disposal of sediment, especially when contaminated, remains an environmental concern.

Shipping vessels bearing foreign flags conduct 95 percent of all international trade in the United States. These ships travel the world carrying unknown species and organisms in their ballast water. The introduction of those species and organisms into a non-native environment could wreak havoc on the local marine eco-systems.

Safety: Although safety statistics for the transportation industry have improved significantly over the past two decades, there are still over 6.8 million transportation-related accidents each year. Transportation remains the leading cause of accidental deaths in the US, with over 44,000 fatalities annually.²⁴ Almost 95 percent of transportation fatalities, and an even higher percentage of injuries, occur on our nation's roadways.

Work-related injuries place a significant financial burden upon the transportation industry. Lost work days in an industry already short of labor reduces operational capability. Work-related compensation can significantly impact corporate profits. In their annual report for 2000, Union Pacific reported annual expenses of \$207 million for personal-injury related events, almost 10 percent of operating cash flows.

Security: Drug smuggling, cargo theft, illegal immigration and contraband remain challenges for our transportation industry. Increased foreign trade will exacerbate those challenges. We can expect the demands upon our Coast Guard, Customs Service and Immigration and Naturalization Service to increase proportionally with growing foreign trade.

Our nation's dominant position in the global market makes our transportation industry a center of gravity for the global economy. As such, our transportation system is a target of opportunity for asymmetric warfare. The President's Commission on Critical Infrastructure Protection identified the US transportation system as one of eight critical infrastructures within our country.²⁵ Given its vastness, protection for our system against terrorism presents an overwhelming challenge for national security planners.

STRATEGIC MOBILITY

As the United States continues to draw down its forward deployed capability, the simultaneous requirements of major theater war, military operations other than war, and peacetime engagement increase the importance of strategic mobility. To meet the growing pressures associated with these diverse missions, the Department of Defense (DoD) maintains organic and contracts commercial airlift and sealift to provide flexible, selective, and power projection capabilities.²⁶

The transition from peace to war requires a steady progression of multiple transportation capabilities. The progression begins with rapid response airlift provided by the C-17 and C-5, and commercial capability contained in the Civil Reserve Air Fleet (CRAF). National Security Decision Directive 280 is the policy foundation for the

CRAF partnership and the integration of military and commercial airlift resources. The policy asserts that military and commercial resources are equally important and independent in meeting wartime airlift requirements.²⁷ The policy further stipulates that organic strategic airlift be sized to meet minimum wartime requirements.²⁸ Current mobility planning anticipates that CRAF will provide 90 percent of passenger and 40 percent of cargo strategic airlift capability.²⁹

The afloat prepositioning program plays a major role in strategic mobility. DoD maintains approximately 35 strategically positioned ships to provide quick response capability. This critical program provides enough capacity to sustain two heavy Army divisions for up to 30 days, three Marine Corps Air Ground Task Forces, for up to 30 days, and munitions and fuel for the Air Force and Navy.³⁰

As contingency requirements expand, additional heavy combat forces will require surge and sustainment sealift. The National Sealift Policy provides that DoD will rely upon the commercial ocean carrier industry to the extent that is capable to provide sealift in peace, crisis, and war.³¹ The policy stipulates that US-owned sealift resources must be able to meet security requirements not covered by organic capability and alliance commitments. For surge sealift, DoD first looks to the commercial market to charter ships, as mandated by the 1904 Cargo Preference Act. If suitable heavy lift commercial capability is unavailable, government owned Fast Sealift Ships (FSS), Large Medium Speed Roll-on-Roll-Off (LMSR) and Ready Reserve Force (RRF) ships provide rapid power projection capability. To sustain deployed forces, DoD relies on commercial capacity maintained in the Voluntary Intermodal Sealift Agreement (VISA). The intent of VISA is to ensure DoD access to US flagged commercial capability to augment the DoD organic fleet.

Future military readiness depends on effectively maintaining a balanced mix of both commercial and government owned transportation resources. Several challenges remain that may affect strategic mobility force structure. These include improving C-5 operational reliability, procuring additional C-17s, ensuring rewards exist for commercial participation in readiness programs, and improving enroute infrastructure to ensure throughput capability.

OUTLOOK

The US transportation system will remain a critical element of our national power, both for its contribution to our economic strength through the efficient distribution of goods and services, and for its ability to deploy and sustain our military forces. While the US transportation system is functioning well today, it is essential that we address capacity, infrastructure and labor issues and concerns, especially in the face of projected significant increases in freight volume.

General Industry Forecast: The US transportation industry is primarily privately owned. To date the focus of transportation firms has been on obtaining competitive advantage through greater velocity and throughput, frequently using the existing infrastructure. Companies will continue using advances in information technology to maximize velocity and throughput, as well as provide greater reliability and enhanced services for customers. Two-fold increases in freight volume over the next 20 years will

require expansion of America's transportation system. Adding capacity in the form of additional railways, roads and ports is capital intensive and requires significant lead-time to complete. Rail companies, for example, will likely wait until they recover from recent mergers and consolidations before embarking on any major capital investment in additional railways. In the interim, the focus will be on maximizing efficiencies with existing capital resources. Intelligent systems will become more prevalent, allowing increased efficiencies through smarter operations in lieu of adding capacity.

The container is currently the most efficient way of transporting finished products because it is easy to handle and intermodal, allowing point-to-point shipping. In fact, the container is so efficient it allows opportunities for new ways of manufacturing and distributing products. For example, there is a trend toward establishing wholesale distribution parks for products at or near debarkation ports to allow the maximum cost savings available through the use of containers. There is also a trend by some heavy equipment manufacturers to ship equipment subassemblies in containers to third party logistics providers who perform final assembly of the equipment.

Perhaps the most significant concern facing transportation companies is a worldwide shortage of qualified and well-trained transportation workers. During our domestic and international field studies, several transportation employers expressed their concerns of finding and retaining qualified workers. This is consistent with the findings of recent studies indicating a worldwide shortage of merchant mariners, pilots and aircraft mechanics, truck drivers, and experienced management personnel. Recent studies indicate that few people are being attracted to work in the transportation industry. This is not a new concern and several transportation employers have already instituted recruitment, training and retention programs. Given the projected increases in freight volume and the resulting need for qualified, trained workers, these recruiting, training and retention programs for transportation workers will be a continuing concern.

GOVERNMENT: GOALS AND ROLES

Through partnerships with the private sector, the federal government works as a steward to ensure the country develops and maintains an effective transportation system in support of national security interests. To be effective, the nation's transportation system must be international in reach – linking people and markets across the globe; intermodal in operation – leveraging the individual economies and efficiencies of each transportation mode; intelligent in character – marshalling the extraordinary power of information technology; and innovative – seeking faster, cheaper, safer, and environmentally responsible solutions to transportation challenges.

As the focal point for federal transportation policy, the Department of Transportation should establish strategic goals to ensure the United States maintains and expands its global competitive advantage in transportation systems. These strategic goals should emphasize strengthening the capability of the transportation system to move people and goods in support of US economic, military, political and informational interests. These goals should also address critical safety and environmental issues to promote public health and safety.

To meet these goals, the federal government must partner with industry to focus on the following critical areas:

Infrastructure: The federal government must begin using the Aviation Trust Fund surplus to modernize the air traffic control system. It must build new airport facilities to ease air traffic congestion and maintain high safety and reliability standards. Finally it must also fully fund the quality improvements to highways, bridges, waterways, rail, and mass transit systems that were initiated by the Transportation Equity Act for the 21st Century (TEA-21).

Competition: Internationally, the federal government must work aggressively to ensure that existing open skies treaties with individual European Union member countries are maintained and expanded to the United Kingdom. The federal government should use current foreign ownership restrictions as a bargaining tool for greater access to foreign markets. (Easing foreign ownership restrictions from 25% to 49% will still allow control of domestic carriers.) The federal government must act on airline merger proposals in a way that balances the desire to promote competition with the economic health of the airline industry and its employees, customers, and shareholders.

Mobilization: DoD should expand the military's organic ability to deploy and sustain combat forces such that the strategic triad of airlift, sealift and prepositioned logistics assets supports a two major theater war scenario. Programs such as Fast Sealift Ships, Joint Logistics Over-the-Shore, the C-17, and deployable pipeline systems will greatly enhance the nation's ability to project force anywhere its interests are threatened.

Research and Development: The federal government should provide tax incentives to encourage the development of fuel cells, more efficient and cleaner burning internal combustion engines, and information technology advancements related to the flow of people and goods through transportation networks. In addition, the federal government should support industry efforts to develop high-speed, heavy-lift approaches such as high speed rail, fast sealift, and ships able to carry 10,000 containers.

ESSAYS ON MAJOR ISSUES

The following three essays highlight critical transportation issues in greater detail. The first essay focuses on the Department of Defense's need for secure information infrastructures among those air carriers that are members of the Civil Reserve Air Fleet. The second essay examines how the Internet, e-commerce, and the Ocean Shipping Reform Act of 1998 are changing the face of the maritime shipping sector. The Department of Defense's expanding relationship with the air cargo industry is discussed in the final essay.

FOCUSED LOGISTICS AND CRITICAL INFRASTRUCTURE PROTECTION

The Department of Defense's ability to effectively transport and sustain forces from bases in the United States is vital to achieving national interests in the post-Cold War environment. In response to this challenge, military strategic leaders are redefining the concept of logistics support based upon the commercial-like process of time-definite

delivery that relies on the Internet, rapid air transportation, and in-transit visibility. From a strategic view, the idea is to reduce the logistics footprint – by replacing the ‘mass’ of supplies with visibility over the delivery system – to enhance the agility of deployed joint combat forces. Operationally, focused logistics will integrate “*...information, logistics, and transportation technologies to provide rapid crisis response, to track and shift assets even while enroute, and to deliver tailored logistics packages and sustainment directly at the strategic, operational, and tactical level of operations*”.³²

Inherent in this new concept is the increased dependency of future military success on the critical information infrastructures of the commercial air industry that deploy and sustain military forces. The strategic implication is that commercial air carriers have a critical role in national security and DoD does not have any control over securing the vital commercial air transportation infrastructure.

DoD Reliance on Commercial Airlift

By plan, much of DoD’s core strategic lift capability for peace and wartime missions resides in the commercial sector. Through the Civil Reserve Air Fleet (CRAF) outsourcing program, DoD leverages peacetime business for wartime commitment to augment organic strategic lift capability.³³ Lift statistics from Operation Desert Storm reveal the significant level of DoD reliance on civil aviation for strategic lift. In the Persian Gulf, CRAF carriers performed 5,556 missions, which accounted for 20% of DoD’s overall strategic airlift capability in support of military operations.³⁴ Under focused logistics, DoD is planning on CRAF partners with long-range air transportation capability to transport 90% of DoD passengers and over 40% of air cargo.³⁵

In today’s environment, DoD’s reliance on commercial air transportation to perform peacetime and contingency cargo operations goes beyond physical airframes and now includes the underpinning information infrastructure of the commercial cargo distribution system. From a strategic perspective, the ability to maintain in-transit visibility of commercial assets and shipments provides military commanders a common operating picture of the delivery pipeline and commercial carriers the ability to rapidly respond to DoD time sensitive requirements. Federal Express Corporation (FedEx) provides a good example concerning the importance of in-transit visibility and the commercial information networks DoD will rely upon in future warfighting operations.

Commercially, FedEx employs a primary hub and spoke delivery system, supported by an elaborate information network, to provide time-definite delivery for five million packages a day in 210 countries around the world.³⁶ By leveraging virtual networks, FedEx is able to integrate both sensing and transaction capabilities to ensure real-time awareness on 100% of the shipments they transport.³⁷ Their information system links an air fleet of 663 aircraft, a ground fleet of 44,500 vehicles, and information data centers directly to customers via the Internet.³⁸ To accomplish this connectivity, FedEx’s network system processes more than 100 million data transactions per day to support delivery operations.³⁹

Critical Infrastructure Protection

The new focused logistics model's reliance on uninterrupted access to commercial transportation and in-transit visibility data is fundamentally altering the intensity of DoD's dependency on commercial air-cargo information infrastructures. Increasingly, the connectivity of warfighting operations to interdependent commercial information infrastructures is creating new vulnerability where one person with a computer, modem, and telephone line can break into government and commercial systems, modify data, deny access to logistics data flows, and even shut down an airport's air traffic control system. If left unchecked, adversaries with cyber capabilities could cause serious damage to commercial air-cargo information infrastructures and DoD's deployment and sustainment capability.

In 1996, the President established the Commission on Critical Infrastructure Protection to evaluate the risks associated with cyber attack and to make recommendations on protecting the integrity of the nation's information infrastructure. Two of the conclusions reached by the Commission were: (1) the nation's commercial infrastructure is at serious risk from cyber attack and the capability of adversaries to significantly disrupt operations is readily available, and (2) government and industry do not effectively share information on electronic intrusion.⁴⁰ Particularly concerning to the Commission was the risk to the nation's air transportation network due to interdependences with other critical information infrastructures. Specifically the Commission's report states: "We are seeing the first wave of deliberate cyber attacks, and the potential for harm is clear...We have to be ready for adversaries to launch attacks that could paralyze utilities and services across entire regions."⁴¹ The Commission also found that the developing National Airspace System, which uses the global positioning system (GPS) and open architectures connecting a multitude of telecommunication and satellite networks, would be increasingly susceptible to cyber-attacks.⁴²

In May 1998, Presidential Decision Directive-63 (PDD-63) tasked federal agencies with developing critical infrastructure protection plans, implementing cooperative commercial partnerships, and assessing cyber vulnerabilities in key industry sectors.⁴³ With the issuance of this directive, protection of critical infrastructures was elevated to a national security issue. Review of actions taken by the Department of Transportation and Federal Aviation Administration reveal these agencies are looking inward at protecting air-traffic control systems and developing new approaches to improving future GPS-based systems.⁴⁴ While these systems are critical, the government cannot ignore the need to develop cooperative partnerships with the CRAF airlift sector to protect the uninterrupted flow of logistics data and strategic lift capability.

Shaping a New Strategy

PDD-63 recognizes that addressing interdependent computer-based risks requires strategic partnerships that cross the boundaries of public and private sector organizations. With this recognition comes the need to embrace innovative approaches for developing partnerships and the requirement to question traditional methods of doing business with CRAF partners. To provide greater protection of commercial air transportation critical information infrastructures, DoD should investigate the following actions for potential implementation.

First, the DoD must undertake an activist approach to developing strategic public-private partnerships with CRAF carriers on infrastructure protection. In terms of managing strategic partnerships, developing trust – so commercial carriers willingly share information on proprietary information systems, cyber attacks, and protective measures – is essential. To develop this trusted environment, all organizations (public and private) having a role in DoD air transportation must be involved in the partnership process.

The National Defense Transportation Association (NDTA) provides a potential avenue for developing a trusted environment across government and commercial organizational boundaries. The Commander-in-Chief of United States Transportation Command and the President of NDTA co-chair the NDTA Airlift Committee, which includes CEO representation from each CRAF carrier. Under the auspices of the NDTA, the committee has the ability to develop working groups and share information on critical infrastructure protection without fear of violating anti-trust laws or subjecting data to release under the Freedom of Information Act. Areas to explore further under this concept include conducting exercises where government “hacker” teams try to penetrate commercial systems to identify vulnerabilities, developing commercial market risk assessments, mapping interdependencies with other critical infrastructures, and coordinating policies on business continuity.

Next, and just as important, USTRANSCOM should examine the potential benefits associated with considering critical infrastructure protection in the award of CRAF contract business allocations. While the DoD cannot pay all of the costs associated with commercial infrastructure protection, considering business continuity and information assurance when making contract award trade-off decisions may promote commercial investment and improve information reliability. For example, FedEx maintains, and periodically exercises, a redundant power generating capability for data centers and hubs to ensure business continuity in the event of electrical power failure due to cyber or natural causes.⁴⁵ Providing companies credit for proactive infrastructure protection measures in the contracting process – when it supports our operational capability – will promote awareness and may incentivize needed investments in the air transportation sector. At the end of the day, the overnight delivery operations of FedEx – upon which the DoD relies for focused logistics capability – cannot effectively exist without a myriad of computers, digital tags, extensive communication links, and the situational awareness these systems provide.

While the United States military is the most advanced technology fighting force in the world today, it is also the most vulnerable because of its reliance on commercial information and networks. The vulnerability of denied commercial capability from CRAF carriers is particularly serious because failure can quickly flow through the military theater distribution system and affect battlefield performance.

PDD-63 was the first step in developing a strategic approach for broad-based awareness across diverse commercial sectors. Now, it is imperative that DoD investigates new strategic partnership models to facilitate the culture change needed to implement critical information infrastructure protection in the airlift sector. To further this end, DoD should also explore implementing a new contract award model considering commercial investments in infrastructure protection.

MARITIME SHIPPING INDUSTRY MOVES INTO THE INTERNET

In October 1999, Brian Milligan, writing for Purchasing Magazine, noted how ocean shipping is lagging behind other modes of transportation with regard to tracking visibility and use of the Internet.⁴⁶ Spurred on by the Ocean Shipping Reform Act of 1998 (OSRA), numerous efforts by shippers, shipping lines, and partnerships between Maritime Shipping Industry leaders and Internet ventures are revolutionizing the ocean shipping industry. The changes will be fast, unpredictable, and will dramatically alter the structure of the industry. The industry will become more efficient, more consolidated, more responsive, and more competitive—opening possibilities of greatly reduced pricing and bringing the industry into the supply-chain management equation on more equal footing with other transportation industries.

Ocean Shipping Reform Act of 1998

OSRA continued the trend toward deregulation established by the Shipping Act of 1984. Its principal goal was to provide shippers and ocean carriers greater choice and flexibility in entering contractual relationships with shippers for ocean transportation and intermodal services.⁴⁷ In the technology arena, OSRA replaces the paper-based tariff filing system with requirements for electronic posting of tariffs on the Internet and other online services, in accordance with Federal Maritime Commission (FMC) regulations.⁴⁸

According to Michael Fabey, of Traffic World Magazine, one result of OSRA was to bring the United States and European shipping regulations closer. Europe and the United States exempt international shipping lines from antitrust laws, promote competition in the industry with tools like independent service contracts or require shippers and shipping lines to disclose any such details.⁴⁹ OSRA allowed confidential carrier-shipper service contracts and set the stage for a free market in ocean transport of freight. Third-party agents and Non-Vessel Ocean Common Carriers (NVOCCs) are forming consortiums to increase and market their buying power. The use of confidential global contracts is on the rise between shippers and carriers. Shippers are forming associations to leverage their negotiating position with carriers.⁵⁰

Several factors have hindered shippers in their efforts to take advantage of the expected benefits of OSRA. Richard Bolte Jr., writing for Business Credit, noted that carrier discussion agreements continue to thrive. This results in carriers setting higher prices. Shippers have also been unable to use the flexibility of the law to force carriers to accept greater liability for damaged cargo. Small-and medium-volume shippers have not found it as easy to get low rates. All shippers are now in a better position to negotiate relationships that yield better service and cut costs and go far beyond bargain basement prices.⁵¹ Despite the failure of OSRA to completely open the market, Bob Capaldo, the Vice President and Chief Information Officer at Maersk, believes that the economic regulatory reform of the ocean carriage industry will open the door for more e-commerce. He stated, “The Internet will be where all shipping orders are placed, bids for best routing occur and where shipping routes are posted. It will eliminate manual preparation of bills

of lading. Therefore, future competition will not be restricted to other steamship companies. Independent firms are likely to become key players quickly."⁵² Harold J. Creel Jr., Chairman of the FMC, feels the OSRA has done what it was meant to do so far as evidenced by the growing satisfaction of shipper."⁵³ It is still too early to determine the results of OSRA; but early indications are positive for the industry, and Internet transactions will increase.

The Internet Boom In Ocean Shipping

The charge toward using the Internet is occurring in several ways simultaneously. Shippers are forming supply chain alliances with software specialists to produce products to meet their needs. Large organized shipping groups are forming partnerships with Internet companies to try to establish improved systems. Organizations such as INTTRA, Tradian's Global Transportation Network (GTN), GoCargo.com, Internet Shipping Group (ISL), Neomodal, and LevelSeas.com have jumped into the Internet market for ocean shipping with impressive business backing and Internet experience.

One shipper using the Internet to improve its business process is Compaq. They spend about \$800 million on ocean freight annually, mostly to transport monitors and raw materials from Asian sources to the United States for manufacture, distribution, and sales. According to John Fontanella, an analyst with AMR Research, notoriously inaccurate sales and manufacturing forecasts, coupled with unpredictable computer supply and demand, often results in last-minute decisions to move goods from one place to another, which can increase the cost of transportation as much as 10 times over less hurried arrangements. The solution: an online freight service bidding system that lets Compaq gather a range of bids for any given shipment and select the one that most closely matches its needs. "We see savings of between 3% and 4% using the new system, all of which will translate directly to our bottom line,: said Compaq's Vice President, Charlie Loarridge. Under outsourcing relations with Logistics.com, Compaq sends descriptions of its ocean-shipping needs, outlining in detail what has to move where and when. Logistics.com posts Compaq's shipping requirements on its OptiBid_RFP, which uses proprietary algorithms to analyze shipping proposals based on service levels, benchmark rates, and cost fluctuation. Compaq then chooses which of the ranked shippers to use.⁵⁴ Shippers attempting to improve their supply-chain management are putting increasing pressure on the industry to adopt Internet tools.

One of several major efforts by carriers to get into the Internet is INTTRA. INTTRA is an Internet portal designed to meet the demands for greater simplicity, standardization, and visibility within the global container transportation industry. Created in October 2000, by Maersk-Sealand, P&O Nedlloyd, Hamburg, Hapag-Lloyd Container line, CMA CGM, and several other shipping lines, the service will include tracking cargo movement of multiple carriers, access to scheduling information, and booking requests.⁵⁵

INTTRA hopes to appeal to carriers, logistics service providers, customhouse brokers, and freight forwarders.⁵⁶ It is open to all ocean carriers and offers benefits such as 24/7 services, lower costs, effective worldwide sales channels, reduced administrative cost by paperwork reduction, security, and increased levels of customer satisfaction. It offers shippers a single point of entry, track and trace container booking request and

confirmation, proactive exception reporting, bill of lading information, statistical reports, improved visibility, and transparency of information along the supply chain. Along with their easy to use modules, they stress improved customer service through automation, faster response time, and improved accessibility data. The average international container transaction involves about 21 parties, including consignees, carriers, truckers, forwarders, third-party logistics providers and customs broker houses, said Mark From-Poulsen, interim president and CEO of INTTRA.⁵⁷ INTTRA will facilitate a more efficient operation.

Another Internet venture in the industry is the Global Transportation Network (GTN). GTN is a venture of Trariant, a Silicon Valley technology company, and nine leading ocean carriers. GTN will be launched in 2001. Carriers involved include APL, CP Ships, the container shipping business of Canadian Pacific Ltd., Hanjin, Hyundai, K Line, Senator Lines, and several others.⁵⁸ GTN will leverage Trariant's proven e-commerce platform that includes core transactional capabilities such as booking, tracking, tracing, and scheduling. It will also provide extended capabilities tailored for shippers and carriers including rate and contract management, cargo forecasting, and allocation.⁵⁹

GoCargo.com Inc. (www.GoCargo.com) founded in July 1999, is another newcomer to the Internet ocean-going cargo business. It provides the international shipping industry with a business-to-business real-time exchange for ocean-going container shipments. GoCargo.com provides benefits to shippers and service providers by providing a highly secure marketplace to execute container shipment transactions. Its real-time reverse auction platform enables importers and exporters to reduce their international ocean transport costs by obtaining competitive bids for ocean carriers, NVOCCs, and freight forwarders worldwide. Service providers increase their revenue opportunities with lower sales costs, save time, and optimize their capacity with diverse, pre-screened cargo.⁶⁰

Several other major efforts in the Internet Ocean Shipping market include NeoModal, LevelSeas.com, and Internet Shipping Group LLC (ISG). NeoModal (www.neomodal.com) was established in 1999 by an executive team composed of world-class transportation, logistics, technology, and financial executives (many former Sealand executives). LevelSeas.com is a European based Internet venture. Announced in April 2000, LevelSeas.com is backed by BP Amoco, Cargill, shipbroker Clarksons, and the Royal Dutch/Shell Group. Internet Shipping Group LLC (ISC), was organized in February 2000, with a mission to enhance the ability of all parties in the bulk shipping industry to dramatically improve the visibility, efficiency, and liquidity of their maritime supply networks. ISG's web product is I-Shipping.com. Developed by industry experts, I-Shipping.com strives to bring true connectivity to business in a way that is cost-effective, confidential, and extremely reliable.⁶¹

Internet Benefits for Ocean Shipping Industry

The dramatic increase in available Internet services will have a profound impact on the Ocean Shipping Industry. The market will become more efficient, prices will fall while service improves, competition will increase, and consolidations will continue. Efficient markets will occur as carriers streamline operations to maximize loads and

eliminate unprofitable routes. “International trade is much more efficient and fluid as computers take more and more control of operations,” said Doug Ljungren, the Port of Tacoma’s Business Planning Manager.⁶² “It’s gotten extremely important to get a paperless flow of cargo”, said Paul Chilcote, the Port of Tacoma’s Senior Director of Intermodal Transportation.⁶³

The Internet is enabling more efficient supply-chain management. “The niche operator of tomorrow will be lean, flexible, and professional and will fill an important role in the global transportation network.”⁶⁴ Overhead elimination and more intense competition will reduce cost. The Internet battle for control of ocean shipping revenues will continue to play out. Strong joint efforts between carriers and technology companies are reinvigorating competition and finally bringing the benefits of high tech to the ocean shipping industry.

CDR Leslie D. Martin

CHANGES IN THE AIR CARGO INDUSTRY: GOOD FOR DOD?

The air cargo industry continues to grow at a steady pace in the US market, and is growing even faster in Europe, Asia, and Latin America. The biggest players in this industry are Integrated Express Carriers who provide pick-up and delivery services as well as cargo transport. They offer one or two day service within the US and typically add an extra day for international deliveries. The cargo may be spare parts for repair of military aircraft, basic supplies for deployed troops, or key business documents. United Parcel Service (UPS) and Federal Express (FedEx) are the largest firms in this industry and are making the biggest innovations to expand services and delivery networks. This market is becoming more important to the DOD as it provides improved supply chains with lower costs and better responsiveness.

UPS started in 1913 and now serves about 75% of the US market share of ground parcel deliveries.⁶⁵ UPS owns a fleet of over 200 airplanes in addition to a fleet of almost 150,000 delivery trucks. They are the dominant express package service in the US and have become the primary service for delivery of products via E-commerce. UPS’ major strength is a large fleet of trucks for cheap delivery of domestic packages. Their aircraft fleet provides faster deliveries for their premium services and for worldwide delivery.

FedEx delivery service started in 1973 with overnight deliveries between a mere 25 U.S. cities. Their hub-and-spoke operation proved effective and demand for overnight delivery grew rapidly. Today’s global business environment is becoming more dependent on fast and certain deliveries and has fostered steady FedEx growth. International express delivery has grown with the trend toward companies becoming global entities that move material around the world more frequently. FedEx operates a fleet of over 650 aircraft⁶⁶ and also operates a fleet of over 44,000 trucks. FedEx has become the clear leader for US air express packages and for air cargo in general.

These two large firms are in a fight to gain larger shares of the growing world market. Each company has expanded its capabilities and has enlarged its distribution network. These new capabilities offer new opportunities for the DOD.

Importance to DoD

As the pace of US military deployments has picked up since the end of the Cold War in 1989, and with the reduction in US forward deployed bases, the need to move personnel and equipment supplies from the US has grown. The DOD is becoming more dependant on commercial carriers for deliveries since the military distribution network is simply too small to handle the full need in peacetime or during contingencies. Additionally, the DOD is using commercial supply channels for distribution of spare parts on more and more of our new weapon systems. Thus, the DOD is becoming more reliant on commercial air cargo carriers to meet peacetime and contingency needs.

Issue: Evolving Aircraft Purchase Decisions

The air cargo industry is capital intensive. Jet aircraft are extremely expensive, long-term investments. The decisions for new aircraft are critical for profitability of the air cargo carriers, and demand consideration of buy-versus-lease as a way to reduce long-term investments and the long-term risk.

FedEx and UPS each lease a significant percentage of their aircraft. Overall, US aircraft operators lease close to 50% of their fleets.⁶⁷ A case in point where lease makes sense is the market approach by Boeing to offer commercial variants of the Air Force's C-17 airframe.⁶⁸ FedEx believes there is a real market for airlift of oversize cargo, which currently moves via truck or ship. Fast transport of oversize loads has only been possible on a limited number of Russian AN-124 aircraft. FedEx is seriously looking at leasing a small fleet of BC-17 aircraft to find out the viability of this market niche. A lease arrangement allows FedEx to explore the market size without a long-term commitment.

The choice of commercial aircraft makers has narrowed significantly in the past 30 years. If the number of producers drops too low, competition disappears and aircraft prices could jump up rapidly. The US industry alone supported three major producers in the 1970s, to include Boeing, McDonnell Douglas, and Lockheed. Boeing bought McDonnell Douglas and Lockheed left the commercial aircraft business after suffering significant losses. The good news is that Airbus, a European firm, has emerged as a full competitor in the commercial aircraft market. In fact, both UPS and FedEx announced major buys of large Airbus aircraft during 2000. Since there are now only two aircraft manufacturers and one is a foreign company, there is a new political concern with any major aircraft buy. US purchases from Airbus bring up the specter of potential loss of domestic jobs as a large US company loses market share to its foreign competitor.

Airbus has recently launched a new aircraft, larger than any other commercial aircraft. The new A380 will have two complete passenger decks and will also be available in a cargo version. One underlying reason for consideration of such a large aircraft is the projection of limited capacity at many of the major airports around the world.⁶⁹ A quick and easy way to solve the problem of airport limitations is to use bigger planes and the Airbus A380 is a cost-effective answer to this projected problem.

Since the continued flow of passengers and cargo will be a long-term need of the DOD, the US must continue to fund airport infrastructure improvements. Additionally, the State Department should continue to negotiate Open Skies treaties to ensure US carriers have access to international airports.

Issue: Expanding Capability for Full Logistics Solutions

Both UPS and FedEx have recently developed the expertise to provide full logistics services for customers.⁷⁰ This consulting work has resulted in dramatic business improvements for a number of companies while assuring the air carriers will remain a part of the improved logistics chains. These logistics services can include: planning a company's full supply chain, providing warehouse and inventory control, setting up customer service centers, and managing timely delivery of final products.

A good example of how these consulting services help a business is FedEx's aid to the Fujitsu Company. Fujitsu was having problems delivering laptop computers to US consumers. FedEx moved the warehouse/assembly plant near their distribution hub in Memphis, TN, reworked the supply chains, and took over final product delivery. Fujitsu cut its delivery time in half, cut its inventory 90%, and increased profit by 25%.⁷¹

This type of service might prove useful for military contracts where the prime contractor does not have in-house capability to create an effective supply chain for a weapon system. Third party companies like UPS or FedEx could well become the best way to create an effective supply chain.

Issue: Expanding Capability to Provide E-Commerce Solutions

UPS and FedEx have become industry leaders in the use of E-commerce. Each company is rapidly moving forward to improve customer ordering and to offer better service information. UPS and FedEx customers can track their critical cargo on a 24-hour per day basis via the internet. This new capability is due completely to advances in Information Technology, which make these two companies a natural choice for movement of cargo. The general trend toward reduction of business inventories makes assured, fast delivery ever more important. UPS and FedEx are becoming a critical part of how manufacturing companies reduce cost and become more competitive. These expanded capabilities are also available to create improved military ordering processes and to reduce inventories.

Issue: Increasing Air-Ground Delivery Networks

Both UPS and FedEx have made dramatic changes to their delivery networks to better use their air and ground systems. The result is that both companies have more complete and more efficient delivery networks.

UPS has developed a large fleet of aircraft to facilitate speedy delivery within the US and to enable worldwide express delivery. The addition of the air fleet ensures there is always a distribution chain available. UPS only uses its more expensive air transport when premium fees demand quicker transport. The resulting network is cost-effective.

On the other hand, FedEx has relied on its more expensive air fleet for rapid delivery. To be able to compete with its larger rival, FedEx has made dramatic changes to its ground distribution system. It purchased RPS, a delivery company with a large truck fleet, and is now building a service for ground delivery. This service is rapidly growing to cover the entire US to compete against UPS services with low prices.

On top of the new delivery service to compete with UPS, FedEx has made major changes to its air distribution network. Instead of relying on a simple hub-and-spoke, FedEx now employs five US hubs and uses an increasing number of direct flights between hubs to wring out extra efficiency.

A final change is the recent announcement of a seven-year multi-billion dollar deal where FedEx will carry US Postal Service (USPS) express and priority mail.⁷² The beauty of this deal is that FedEx will be able to use its existing aircraft fleet to move USPS cargo during the day, when its planes normally sit idle. This will offer significant new profits without significant new investment. These profits could lead to lower prices.

Impact of Corporate Expansion to DoD

The competitive changes of UPS and FedEx are good for the DOD. As these carriers, the competition ensures their rates stay low, and new and improved services become available for the DOD. New DOD weapons tend to use commercial supply channels rather than depending on the Defense Logistics Agency. This applies to aircraft such as the C-17 transport and the Joint Strike Fighter, as well as army vehicles like the Interim Armored Vehicle and the Crusader artillery piece. Where the prime contractor has the expertise to develop effective supply chains, they will. When the prime contractor does not have the internal expertise, companies like UPS and FedEx now offer full logistics services. The bottom line here is that the expansion of capabilities by UPS and FedEx offers major new opportunities for the DOD.

Col Paul M. Stipe

CONCLUSION

America's position as the world's superpower is attributable in great measure to the robustness of our country's transportation industry. Although clearly able to support the national security requirements of the United States, our transportation industry faces numerous and serious challenges. Our nation's leaders must address the capacity, infrastructure and environmental issues that threaten our transportation industry. A labor force capable of supporting the industry's expanding needs must be developed. Technology must be leveraged to gain greater efficiencies within our transportation system, ensuring our competitive advantage in the global market. All of these challenges require significant capital investment to sustain the level of performance and support demanded by the American public and the growing economy.

These challenges are not insurmountable but demand the attention of our nation's public and private sectors. The ability of the transportation industry to meet our logistics and mobility needs with minimal impact upon the environment, public safety and personal wealth depends upon informed decisions by governmental agencies, private enterprise and the individual citizen. If the United States is to remain the world's superpower and sustain the world's premiere transportation system, we will do so by harnessing the entrepreneurial spirit, business acumen and democratic values that define our great nation.

END NOTES

¹US Department of Transportation (USDOT). "Highlights March 2001." Bureau of Transportation Statistics (BTS). p1.

² USDOT. "Transportation in the United States-A Review." Table 1-1, and p. 13, 35. USDOT. "DOT Strategic Plan 2000 (Draft). Washington, DC. p. 6.

³ Ibid.

⁴ "Industry Information: Economic Impact." American Association of Port Authorities (3 March 2001), www.aapa-ports.org.

⁵ USDOT. "An Assessment of the US Marine Transportation System." (September 1999). www.marad.dot.gov.

⁶ "American's Ports: Gateways to Global Trade." American Association of Port Authorities (3 March 2001). www.aapa-ports.org.

⁷ "Industry Analysis: the Shipping and Shipbuilding Industry in the United States." Corporate Information (25 April 2001). www.corporateinformation.com

⁸ "Economic Impact of US Freight Railroads." www.aar.org/comm/statfact.nsf.

⁹ Ibid

¹⁰ USDOT. "Transportation Statistics Annual Report 2000." Bureau of Transportation Statistics (BTS) (March 2001). Table 1-1. www.bts.gov.

¹¹ "Industry Indicators." Railway Age (December 2000). p. 9.

¹² "Inside ATA: The Future of Transportation," Remarks of Paul T. Stalknecht, Senior Vice-President, Federation Relations, American Trucking Associations, Inc. before the Military Traffic Management Command Training Symposium, April 4, 2000, Atlanta, Georgia. Reprinted in Truckline. truckline.com/insideata/speeches.

¹³ Ibid.

¹⁴ David Smallen, "BTS Indicators Report Shows Drop in Transportation Profits." US DOT Press Release (31 January 2001). www.bts.gov.

¹⁵ Smallen Press Release.

¹⁶ Steven Pearlstein, "Drop in Business Investment Big Factor in Economy's Stall." Washington Post (20 February 2001).

¹⁷ "1998 Report Card for American Infrastructure." American Society of Civil Engineers.

¹⁸ USDOT. "Transportation Statistics Annual Report-1999." p. 5.

¹⁹ "Current Issues Facing the Industry." American Association of Port Authorities (9 March 2001). www.aapa-ports.org.

²⁰ "Driver Pay Rose 15% in 3 Years, Study Shows," Transport Topics (5 February 2001). www.ttnews.com.

²¹ Stalknecht Remarks.

²² Schipper, Lee. Ting, Michael. Khrushch, Marta. Golove, William. "The evolution of carbon dioxide emissions from energy use in industrialized countries: an end-use analysis." International Energy Agency. Internet. May 19, 2001.

²³ Ibid.

²⁴ "Transportation Safety Statistics." USDOT. Internet. May 17, 2001.

²⁵ S.J. Lukasik, L.T. Greenbert, S.E. Goodman. "Protecting an Invaluable and Ever-Widening Infrastructure." Communications of the ACM, June 1998, Volume 41, Issue 6, p. 11-16.

²⁶ Ferris, Stephen and Keithly, David. "21st Century Logistics: Joint Ties that Bind." (1997).

²⁷ National Security Decision Directive 280. (June 1987).

²⁸ Ibid.

²⁹ Gary Voellger, Major General, Director of Operations, Air Mobility Command . "Testimony to Congressional Subcommittee on Aviation." (May 1997).

³⁰ "Backgrounder." Military Sealift Command (2001).

³¹ "National Sealift Policy." (October 1989).

³² Chairman of the Joint Chiefs of Staff, Joint Vision 2010 (1996).

³³ Frank Weber, Deputy Director for Logistics and Business Operations. "Global Mobility: Industry Partnerships for the National Defense." USTRANSCOM Briefing Given in London (2000).

³⁴ The percentage is based on missions flown during the three phases of deployment – Surge, Deployment, and Redployment – Air Mobility Command Briefing, Civil Reserve Air Fleet: Critical to Readiness, undated.

³⁵ Gary Voellger, Major General, Director of Operations, Air Mobility Command. “Testimony to Congressional Subcommittee on Aviation.” (May 1997).

³⁶ Information Access Company (May 2000), www.lexis.com

³⁷ David Alberts. “Network Centric Warfare: Developing and Leveraging Information Superiority.” www.dodccrp.org.

³⁸ “Transforming IT Sourcing Delivers Savings for FedEx.” newsfirstsearch.oclc.org.

³⁹ Ibid.

⁴⁰ “Presidential Commission Critical Infrastructure Protection Report.” (October 1997).

⁴¹ Ibid.

⁴² James Carroll. “Vulnerability Assessment of the Transportation Infrastructure Relying on the Global Positioning System.” Volpe Transportation Center (1999).

⁴³ William J. Clinton. “The Clinton Administration’s Policy on Critical Infrastructure Protection: PDD-63.” White Paper (May 1998).

⁴⁴ William J. Clinton. “Report of the President of the United States, Status of Federal Critical Infrastructure Protection Activities.” (January 2001).

⁴⁵ IRMC Information Assurance Class, Briefing on Commercial Business Measures, March 2000.

⁴⁶ Brian Milligan. “Ocean shipping tracking lags behind with Internet.” Purchasing Magazine (October 21, 1999). p. S86.

⁴⁷ Ira Lewis and David B. Vellenga. “The Ocean Shipping Reform Act of 1998.” Transportation Journal (Summer 2000). p. 27-34.

⁴⁸ Ibid. p. 27-34.

⁴⁹ Michael Fabey. “Narrowing differences.” Traffic World (November 6, 2000). p. 22-23.

⁵⁰ Richard J. Bolte Jr. “Global logistics/transportation: An evolving frontier of strategic value and total savings.” Business Credit (Nov/Dec 2000).

⁵¹ Ibid.

⁵² Anonymous. “Perspectives on e-commerce.” Traffic World (November 8, 1999). p. 21.

⁵³ Michael Fabey, p. 23.

⁵⁴ Theo Mullen. “Shipping Costs to Sink-Compaq turns to Web service to coordinate overseas logistics.” Internet Week (December 4, 2000). p. 1,96.

⁵⁵ John Parker. “Enter intra.” Traffic World (November 6, 2000). p.22.

⁵⁶ “INTTRA Information Site.” www.inttra.com.

⁵⁷ Kathleen Hickey. “Open seas.” Traffic World (December 18-December 25, 2000). p. 32-33.

⁵⁸ Michael Fabey. “Realizing the promise.” Traffic World (December 11, 2000). p. 31-32.

⁵⁹ Ibid. p. 31-32.

⁶⁰ “Business wire.” (August 23, 2000).

⁶¹ “ISG Press Release.” (October 17, 2000).

⁶² Al Gibbs. “Ships, railroads may carry the cargo, but computers control it.” The News Tribune (May 21, 2000). p. D2.

⁶³ Ibid. p. D2.

⁶⁴ Toby B. Gooley. “Ocean shipping: Surprises dead ahead.” Logistics Management and Distribution Report.” Radnor (July 2000). p. 79-83.

⁶⁵ Kevin O’Toole, “A Battle for E-Cargo.” Airline Business (September 1, 2000). p. 57.

⁶⁶ “FedEx Express Fact Sheet.” (February 7, 2001).

⁶⁷ Ted Gogoll. “Report Sees US Overcapacity; Details Global Fleet Outlook.” Aviation.Now news release (27 March 2001).

⁶⁸ “Air Force Proposes Plan to Help Boeing With Sales of Planes.” New York Times (March 19, 2001).

⁶⁹ Michael Miller. “Tackling the Silent Killer of Economic Development.” Aviation Daily (January 18, 2001). p. 5.

⁷⁰ Kevin O’Toole. p. 57.

⁷¹ Tim Smart. “Delivering Packages, Partnerships.” Bloomberg News (May 2, 1999).

⁷² “FedEx-Postal Service Deal to Rocket Memphis Cargo Business.” Airport (January 16, 2001).

BIBLIOGRAPHY

“1998 Report Card for American Infrastructure.” American Society of Engineers. Washington, DC. 1998.

“Briefing on Commercial Business Measures.” IRMC Information Assurance Class, March 2000.

“Business Wire.” August 23, 2000.

“Driver Pay Rose 15% in 3 Years, Study Shows.” Transport Topics, February 5, 2001. Internet. April 18, 2001.

“Economic Impact of US Freight Railroads.” Association of American Railroads. Internet.

“Federal Express Fact Sheet.” February 7, 2001.

“FedEx-Postal Service Deal to Rocket Memphis Cargo Business.” Airport, January 16, 2001.

“Industry Analysis: The Shipping and Shipbuilding Industry in the United States.” Corporate Information, April 25, 2001.

Anonymous. “Industry Indicators.” Railway Age, Volume 201, Issue 12, December 2000. Internet. Proquest.

“Industry Information: Economic Input.” American Association of Port Authorities, March 3, 2001.

“Inside ATA: The Future of Transportation.” Remarks of Paul T. Stalknecht, Senior Vice-President, Federal Relations, American Trucking Associations, Inc. before Military Traffic Management Command, April 4, 2000. Reprinted Truckline. Internet. April 18, 2001.

“ISG Press Release.” October 17, 2000.

“Military Sealift Command.” Backgrounder, 2001.

“Perspectives on e-commerce.” Traffic World (Washington), Volume 260, Issue 6, November 8, 1999. Internet. Proquest.

“Presidential Commission Critical Infrastructure Protection Report.” October 1997.

“Transforming IT Sourcing Delivers Savings for FedEx.” Internet. New First Search.

“Transportation: Commercial Industry Survey.” Standards & Poor’s, November 2000.

Alberts, David. “Network Centric Warfare: Developing and Leveraging Information Superiority.” Internet.

Bolte, Richard J. Jr. “Global logistics/transportation; an evolving frontier of strategic value and total savings.” Business Credit (NY), November/December 2000.

Carroll, James. “Vulnerability Assessment of the Transportation Infrastructure Relying on the Global Positioning System.” Volpe Transportation Center, 1999.

Chairman of the Joint Chiefs of Staff. “Joint Vision 2010.” 1996.

Clinton, William J. “Status of Federal Critical Infrastructure Protection Activities.” Report of the President of the United States, January 2001.

Clinton, William J. "The Clinton Administration's Policy on Critical Infrastructure Protection: PDD-63." White Paper, May 1998.

Dao, James. "Air Force Proposes Plan to Help Boeing With Sales of Planes." New York Times (NY), March 19, 2001.

Fabey, Michael. "Narrowing Differences." Traffic World (Washington), Volume 264, Issue 6, November 6, 2000. Internet. Proquest.

Fabey, Michael. "Realizing the promise." Traffic World (Washington), Volume 264, Issue 11, December 11, 2000. Internet. Proquest.

Ferris, Stephen and David Keithly. "21st Century Logistics: Joint Ties That Bind." 1997.

Gibbs, Al. "Ships, railroads may carry the cargo, but computers control it." The News Tribune, May 21, 2000.

Gogoll, Ted. "Report Sees U.S. Overcapacity; Details Global Fleet Outlook." Aviation.Now News Release, March 27, 2001.

Gooley, Toby B. "Ocean Shipping: Surprises dead ahead." Logistics Management and Distribution Report (Radnor), July 2000.

Helmick, Jon S. "Intermodal Ports and Liner Shipping: A 21st Century Status Report."

Hickey, Kathleen. "Open Seas." Traffic World (Washington), Volume 264, Issues 12/13, December 18-December 25, 2000. Internet. Proquest.

Information Access Company. May 2000. Internet. Lexis.

Klein, Stephen R. "Transportation: Commercial." Industry Surveys, Standard & Poor's (NY), February 3, 2000.

Lewis, Ira and David B. Vellenga. "The Ocean Shipping Reform Act of 1998." Transportation Journal (Lock Haven), Volume 39, Issue 4, Summer 2000. Internet. Proquest.

Lukasik, S.J., L.T. Greenberg, and S.E. Goodman. "Protecting an Invaluable and Ever-Widening Infrastructure." Communications of the ACM, Volume 41, Issue 6, June 1998.

McMahon, Christopher J. CAPT USMS. "The Issues and Challenges Forcing America's Maritime and Intermodal Transportation System in the Early 21st Century."

Miller, Michael. "Tracking the Silent Killer of Economic Development." Aviation Daily, January 18, 2001.

Milligan, Brian. "Ocean shipping tracking lags behind with Internet." Purchasing Magazine, Cohners Business Information, October 21, 1999.

Mullen, Theo. "Shipping Costs to Sink-Compaq turns to Web service to coordinate overseas logistics." Internet Week (Manhasset), December 4, 2000.

O'Toole, Kevin. "A Battle for E-Cargo." Airline Business, September 1, 2000.

Parker, John. "Enter inttra." Traffic World (Washington), Volume 264, Issue 6, November 6, 2000. Internet. Proquest.

Pearlstein, Steven. "Drop in Business Investment Big Factor in Economy's Stall." Washington Post (DC), February 20, 2001. Internet. Proquest.

Pegram, Dudley F. "Transportation Economics and Public Policy." 3rd Edition Richard D. Irwin, 1973.

Smallen, David. "BTS Indicators Report Shows Drop in Transportation Profits." USDOT Press Release, January 31, 2001. Internet. February 6, 2001.

Schipper, Lee. Michael Ting, Marta, Khrushch, and William Golove. "The evolution of carbon dioxide emissions from energy use in industrialized countries: an end-use analysis." International Energy Agency. Internet. May 19, 2001.

Smart, Tim. "Delivering Packages, Partnerships." Bloomberg News, May 2, 1999.

United States Department of Transportation (USDOT). "DOT Strategic Plan 2000 (Draft)." Washington, DC. 2000.

United States Department of Transportation (USDOT). "Transportation Safety Statistics." Internet. May 17, 2001.

United States Department of Transportation (USDOT). "Transportation Statistic Annual Report-1999."

United States Department of Transportation (USDOT). Bureau of Transportation Statistics (BTS). "An Assessment of the U.S. Marine Transportation System." September 1999.

United States Department of Transportation (USDOT). Bureau of Transportation Statistics (BTS). "National Transportation Statistics 2000." Washington, DC.

United States Department of Transportation (USDOT). Bureau of Transportation Statistics (BTS). "Transportation in the United States, a review." 1997.

United States Department of Transportation (USDOT). Bureau of Transportation Statistics (BTS). "Transportation Statistics Annual Report 2000." Washington, DC. Internet. March 2001.

United States National Sealift Policy. October 1989.

United States National Security Decision Directive 280. June 1987.

Voellger, Gary Major General. "Testimony to Congressional Subcommittee on Aviation." May 1997.

Weber, Frank. "Global Mobility: Industry Partnerships for the National Defense." USTRANSCOM Briefing (London, England), 2000.